PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Cinderella BLANCHAT et al.	) Group Art Unit:
Serial No:		) Examiner:
Filed:		) Attorney Docket No: 7594-83862 (SGcsbF1228/2 US)
For:	BIOMATERIAL BASED ON AN INSOLUBILISED DEXTRAN DERIVATIVE AND A GROWTH FACTOR	)

PRELIMINARY AMENDMENT

Commissioner for Patents
Washington, D.C. 20231

Sir:

Please amend the above-identified U.S. patent application as follows:

In the Claims

Please amend claims 3-6, 8-11, and 13-23 as follows:

--3. (Amended) The biomaterial as claimed in claim 1 [or claim 2], characterized in that said growth factor is selected from the group consisting of EGFs, IGFs, FGFs, TGF-βs, PDGFs and BMPs.

4. (Amended) The biomaterial as claimed in claim 1 [any one of the preceding claims], characterized in that said growth factor has an osteoinductive activity and is a BMP.

5. (Amended) The biomaterial as claimed in claim 1 [any one of the preceding claims], characterized in that it comprises several insolubilized dextran derivatives and/or several growth factors involved in the bone reconstruction process.

6. (Amended) The biomaterial as claimed in claim 1 [any one of the preceding claims], characterized in that it is insolubilized by crosslinking with the aid of a crosslinking agent.

8. (Amended) The biomaterial as claimed in claim 1 [any one of the preceding claims], characterized in that it exists in the form of a hydrogel.

9. (Amended) The biomaterial as claimed in claim 1 [any one of claims 1 to 7], characterized in that it exists in the form of a freeze-dried powder.

10. (Amended) The biomaterial as claimed in claim 9, characterized in that said freeze-dried powder is obtained from biomaterial existing in the form of a [the] hydrogel [defined in claim 8].

11. (Amended) The biomaterial as claimed in claim 1 [any one of the preceding claims], characterized in that it comprises, in addition, a tissue filling material.

13. (Amended) The biomaterial as claimed in claim 11 [or claim 12], characterized in that said tissue filling material is selected from the group consisting of collagen, gelatin, biological adhesive, polymers of polylactic or polyglycolic acids, and copolymers of polyethylene glycol and polylactide-co-glycolide.

14. (Amended) The biomaterial as claimed in claim 11 [or claim 12], characterized in that said tissue filling material is an osteoconductive material selected from the group consisting of coral, hydroxyapatite, a mixture of collagen and hydroxyapatite, tricalcic calcium phosphate, calcium sulfate, and calcium carbonate.

15. (Amended) A process for preparing the solid biomaterial as claimed in claim 1 [any one of claims 1 to 11 and 13], characterized in that the process [it] comprises the following steps:

crosslinking of at least one dextran derivative of general formula $DMC_aB_bSu_cS_d$ as defined in claim 1 or claim 2,

adsorption, in the insolubilized dextran derivative obtained above, of at least one growth factor as defined in any one of claims 1 to 4,

production of a solid biomaterial according to any one of claims 1 to 8 in the form of a hydrogel,

optionally, the freeze-drying of said hydrogel in order to obtain said biomaterial in the form of a powder.

16. (Amended) The process as claimed in claim 15, characterized in that said crosslinking of at least one dextran derivative of general formula $DMC_aB_bSu_cS_d$ is carried out with the aid of a crosslinking agent [as defined in claim 6 or claim 7] selected from the group consisting of sodium trimetaphosphate, epichlorohydrin, divinyl sulfone, gluteraldehyde and bisepoxiranes.

17. (Amended) The process as claimed in claim 15 [or claim 16], characterized in that the crosslinking of at least one dextran derivative of general formula $DMC_aB_bSu_cS_d$ is carried out in the presence of a tissue filling material.

18. (Amended) The process as claimed in claim 17, characterized in that said tissue filling material is [as defined in claim 13 or claim 14] selected from the group consisting of collagen, gelatin, biological adhesive, polymers of polylactic or polyglycolic acids, copolymers of polyethylene glycol and polylactide-co-glycolide, and an osteoconductive material selected from the group consisting of coral, hydroxyapatite, a mixture of collagen and hydroxyapatite, tricalcic calcium phosphate, calcium sulfate, and calcium carbonate.

19. (Amended) A process for preparing the biomaterial as claimed in claim 12, characterized in that it comprises the following steps:

bringing the dextran derivative into contact with particles of an inorganic or polymeric insoluble support, as defined in claim 12, so as to obtain a composite,

insolubilization of the composite obtained above, in the presence of a crosslinking agent,

adsorption, in the insolubilized composite obtained above, of at least one of said growth factors [as defined in claims 1 to 4].

20. (Amended) The use of the solid biomaterial as claimed in claim 1 [any one of claims 1 to 14] for the preparation of a repair or filling material for osteoarticular, dental or maxillofacial applications.

21. (Amended) The use of the solid biomaterial as claimed in claim 20 for the preparation of osteoarticular, dental or maxillofacial implants.

22. (Amended) The use of a solid biomaterial as claimed in claim 1 [any one of claims 1 to 14] for the preparation of a coating for orthopedic, dental or maxillofacial prostheses.

23. (Amended) A functionalized prosthesis, characterized in that at least part of its surface is coated with a solid biomaterial as claimed in claim 1 [any one of claims 1 to 14].

Correspondence Address

All future correspondence concerning the above-identified U.S. patent application should be addressed to the undersigned attorney at the following address:

Thomas W. Tolpin
Welsh & Katz, Ltd.
22nd Floor
120 South Riverside Plaza
Chicago, IL 60606
Phone: (312) 655-1500
Fax: (312) 655-1501

Remarks

Reconsideration of the subject U.S. patent application in light of the present Amendment and Remarks is respectfully requested.

Authorization is hereby given to charge any deficiency in fees or any other fees in connection with the subject patent application to our Deposit Account No. 23-0920.

Claims 3-6, 8-11, and 13-23 have been amended to avoid multiple dependency and better conform to U.S. practice.

A clean version of the entire set of pending claims is enclosed in accordance with 37 CFR 1.121 (c) (3).

The correspondence address has been updated.

Examination and allowance of the U.S. patent application with the pending claims as amended is respectfully requested.

Respectfully submitted,

Thomas W. Tolpin

Thomas W. Tolpin
Registration Number 27,600
Attorney for Applicants

Address:

Welsh & Katz, Ltd.
22nd Floor
120 South Riverside Plaza
Chicago, IL 60606
Phone: (312) 655-1500

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CLEAN VERSION OF ENTIRE SET OF PENDING CLAIMS

A clean version of the entire set of pending claims is enclosed in accordance with 37 CFR 1.121 (c) (3).

Each claim of the clean version of the entire set of claims begins on a separate page in order to facilitate optical scanning of the claims by the U.S. Patent and Trademark Office.

1. A solid biomaterial, characterized in that it essentially comprises:

(1) at least one solid support material consisting of at least one insolubilized dextran derivative of general formula $DMC_aB_bSu_cS_d$ in which:

D represents a polysaccharide chain, preferably consisting of successions of glucoside units,

MC represents methyl carboxylate groups,

B represents carboxymethylbenzylamide groups,

Su represents sulfate groups (sulfation of the free hydroxyl functional groups carried by the glucoside units),

S represents sulfonate groups (sulfation of the aromatic rings of the B groups),

a, b, c and d represent the degree of substitution (ds), expressed relative to the number of free hydroxyl functional groups in a glucoside unit of the dextran, respectively in MC, B, Su and S groups; a being ≥ 0.3, b being equal to 0 or ≥ 0.2, c being equal to 0 or ≥ 0.1 and d being equal to 0 or ≤ 0.15, provided that when b is equal to 0, c is not equal to 0, and

(2) at least one growth factor exhibiting activity on the osteoarticular, dental and/or maxillofacial tissues.

2. The biomaterial as claimed in claim 1, characterized in that said insolubilized dextran derivative is such that d is equal to 0.

3. (Amended) The biomaterial as claimed in claim 1, characterized in that said growth factor is selected from the group consisting of EGFs, IGFs, FGFs, TGF-βs, PDGFs and BMPs.

4. (Amended) The biomaterial as claimed in claim 1, characterized in that said growth factor has an osteoinductive activity and is a BMP.

5. (Amended) The biomaterial as claimed in claim 1, characterized in that it comprises several insolubilized dextran derivatives and/or several growth factors involved in the bone reconstruction process.

6. (Amended) The biomaterial as claimed in claim 1, characterized in that it is insolubilized by crosslinking with the aid of a crosslinking agent.

7. The biomaterial as claimed in claim 6, characterized in that said crosslinking agent is selected from the group consisting of sodium trimetaphosphate, epichlorohydrin, divinyl sulfone, gluteraldehyde and bisepoxiranes.

8. (Amended) The biomaterial as claimed in claim 1, characterized in that it exists in the form of a hydrogel.

9. (Amended) The biomaterial as claimed in claim 1, characterized in that it exists in the form of a freeze-dried powder.

10. (Amended) The biomaterial as claimed in claim 9, characterized in that said freeze-dried powder is obtained from biomaterial existing in the form of a hydrogel.

11. (Amended) The biomaterial as claimed in claim 1, characterized in that it comprises, in addition, a tissue filling material.

12. The biomaterial as claimed in claim 11, characterized in that it coats particles of an inorganic or polymeric insoluble support, said particles having a diameter greater than 100 μm.

13. (Amended) The biomaterial as claimed in claim 11, characterized in that said tissue filling material is selected from the group consisting of collagen, gelatin, biological adhesive, polymers of polylactic or polyglycolic acids, and copolymers of polyethylene glycol and polylactide-co-glycolide.

14. (Amended) The biomaterial as claimed in claim 11, characterized in that said tissue filling material is an osteoconductive material selected from the group consisting of coral, hydroxyapatite, a mixture of collagen and hydroxyapatite, tricalcic calcium phosphate, calcium sulfate, and calcium carbonate.

15. (Amended) A process for preparing the solid biomaterial as claimed in claim 1, characterized in that the process comprises the following steps:

crosslinking of at least one dextran derivative of general formula $DMC_aB_bSu_cS_d$ as defined in claim 1 or claim 2,

adsorption, in the insolubilized dextran derivative obtained above, of at least one growth factor as defined in any one of claims 1 to 4,

production of a solid biomaterial according to any one of claims 1 to 8 in the form of a hydrogel,

optionally, the freeze-drying of said hydrogel in order to obtain said biomaterial in the form of a powder.

16. (Amended) The process as claimed in claim 15, characterized in that said crosslinking of at least one dextran derivative of general formula $DMC_aB_bSu_cS_d$ is carried out with the aid of a crosslinking agent selected from the group consisting of sodium trimetaphosphate, epichlorohydrin, divinyl sulfone, gluteraldehyde and bisepoxiranes.

17. (Amended) The process as claimed in claim 15, characterized in that the crosslinking of at least one dextran derivative of general formula $DMC_aB_bSu_cS_d$ is carried out in the presence of a tissue filling material.

18. (Amended) The process as claimed in claim 17, characterized in that said tissue filling material is selected from the group consisting of collagen, gelatin, biological adhesive, polymers of polylactic or polyglycolic acids, copolymers of polyethylene glycol and polylactide-co-glycolide, and an osteoconductive material selected from the group consisting of coral, hydroxyapatite, a mixture of collagen and hydroxyapatite, tricalcic calcium phosphate, calcium sulfate, and calcium carbonate.

19. (Amended) A process for preparing the biomaterial as claimed in claim 12, characterized in that it comprises the following steps:

bringing the dextran derivative into contact with particles of an inorganic or polymeric insoluble support, as defined in claim 12, so as to obtain a composite,

insolubilization of the composite obtained above, in the presence of a crosslinking agent,

adsorption, in the insolubilized composite obtained above, of at least one of said growth factors.

20. (Amended) The use of the solid biomaterial as claimed in claim 1 for the preparation of a repair or filling material for osteoarticular, dental or maxillofacial applications.

21. (Amended) The use of the solid biomaterial as claimed in claim 20 for the preparation of osteoarticular, dental or maxillofacial implants.

22. (Amended) The use of a solid biomaterial as claimed in claim 1 for the preparation of a coating for orthopedic, dental or maxillofacial prostheses.

23. (Amended) A functionalized prosthesis, characterized in that at least part of its surface is coated with a solid biomaterial as claimed in claim 1.